lower Great Lakes during the day and reached the vicinity of Buffalo at 5 p. m. on the 24th. This motion would carry the air to New Hampshire by about midnight. The path indicated goes northeastward through Iowa, and gradually curves eastward over the Lower Great Lakes region, approaching New England from west-northwest.

This path is verified by observational evidence of dustfalls. Dust was observed to spread over central Kansas and aloft over the eastern portion of that State on the 24th, appearing at high levels even at North Platte, Nebr. During the airplane observation at Omaha, begun at 4 a. m. on the 24th, dust was observed between 2,230 and 3,430 meters. From that station eastward to Buffalo, no observation of the dust was noted, because general cloudiness prevailed without precipitation; and the obscuring effect of the dust, which at this time was only aloft, could not be distinguished from that of the clouds. The dust became apparent in northern New York when rain which had mixed with the dust to produce mud was observed.

The conditions in the "dust bowl" on February 23 when this dust began to be raised are described in the report of Glen H. Phillips, Weather Bureau observer at Pueblo, Colo. He writes:

> Black, swirling clouds of dust rolled over practically every county [in Colorado] south of the 40th parallel and east of the 105th meridian. The air was heavily laden with dust over this area, reducing the visibility to practically nothing in many localities and completely halting motor traffic. Pueblo experienced the worst storm since the St. Patrick's Day "black blizzard" of 13 years ago. Semidarkness enveloped the entire southeastern portion of the State and artificial light was used during midday.

Similar conditions were reported in western Oklahoma, the Texas Panhandle, northeastern New Mexico, and at Dodge City, Kans.

The reports from northern New York give an interesting account of how the dust was precipitated late the following day out of the upper air along with the raindrops. At Buffalo, light dust had been observed in the afternoon by airplane pilots, who reported it as occupying a layer between 6,000 and 10,000 feet altitude. In the evening, between 7 and 8:15 p. m., the dust was brought down with a misting rain, which produced a thin coating of mud visible on polished objects such as automobiles. At Oswego, at 5:30 p. m. the sky was darkened by heavy clouds of a yellow color. Breaking of the clouds shortly after sunset showed the yellow color quite prominently. Subsequently reports were received of a small deposit of dust on automobiles which had been out between 5 and 7 p. m. The dust was reported at the following stations in the vicinity: Watertown, Tupper Lake, Alexandria Bay, and Willsboro.

At Canton, N. Y., there was a light fall of dust with the rain which occurred late in the afternoon and in the evening. H. E. Heyer, Weather Bureau official at Canton, writes:

> Motorists report that the windshields of their cars became so heavily streaked with mud as to interfere seriously with vision, making it necessary, in some cases, to stop and clean off the mud deposit.

The dust-laden air from the southwest was acting along a warm front against a colder air mass to the east. Over northern New England the air rising upward along the sloping warm front surface had reached a height such that snow was formed instead of rain. This snow showed the presence of dust just as had the falling rain. Falling with the snow, the dust produced a striking effect in the peculiar brown color it gave to the snow.

DUSTSTORMS OF FEBRUARY AND MARCH 1936 IN THE UNITED STATES

By R. J. MARTIN

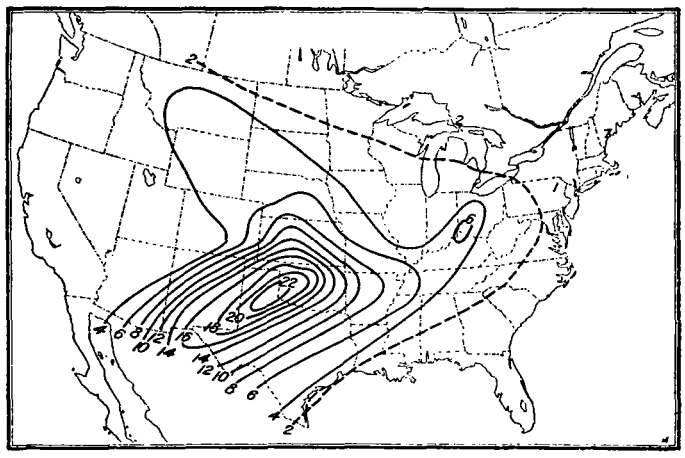
[Weather Bureau, Washington, D. C., April 1936]

The *Weekly Weather and Crop Bulletin* for the week ending February 4, 1936, carried the following statement: "The soil continues much too dry in the southwestern Plains, centering in southwestern Kansas and southeastern Colorado, with strong probability of drifting and duststorms unless more moisture is received soon."

Moisture sufficient to relieve the droughty conditions failed to materialize; and numerous and severe duststorms occurred over southeastern Colorado, northeastern New Mexico, western Kansas, and western Oklahoma in February. Late in the month, dust was reported as far east as Missouri, and some cooperative observers in Texas reported crop damage. In western, and some central, sections of Kansas the storms were of marked intensity; and on the 22d, visibility was so reduced by dust in portions of Colorado that pedestrians collided with one another in attempting to get about during the height of the storm. On the 24th, dusty conditions prevailed in portions of northern New York. These last two storms are described in the February 1936 MONTHLY WEATHER REVIEW.

The accompanying chart shows the number of days with duststorms or dusty conditions in March 1936, and is based only on reports from first-order stations of the Weather Bureau. It will be seen that the greatest number occurred in the persistently dry area centering over the Southern Great Plains, the frequency decreasing rather uniformly with distance from this droughty source—the "Dust Bowl."

Early in March, duststorms were reported in eastern New Mexico, where conditions were more favorable for their inception than in the preceding year, and in most



Number of days with duststorms, or dusty conditions, March 1936.—W. A. M

other sections of the dry southwestern area, especially in the Oklahoma Panhandle and southeastern Colorado. During the week ending March 24 severe storms, some of them the worst reported so far this year, occurred in several southwestern States. Dust from western Kansas was carried through the air to the eastern part of the State, but here the storms were not so severe as those of March

of the preceding year. At St. Joseph, Mo., visibility was reduced to one-fifth mile on the 23d; and on the following day similar conditions prevailed at Memphis, Tenn. At Davenport, Iowa, on the 24th visibility was reduced to 200 yards.

The Southwest remained dry as the month ended, with severe and extensive duststorms reported during the closing week, and in the Pacific Northwest storms blew out some spring-seeded wheat on light lands. As far east as Portland, Maine, dust from the western area was noted on several days; and on the 9th and 11th, a yellowish tinge to snow was noted generally over New England.

The *Weekly Weather and Crop Bulletin* for the week ending March 17, 1936, contains a chart showing the percentage of normal precipitation for the 18-month period, September 1934 to February 1936, inclusive, and also an article on the causes of duststorms. The migration of duststorm sources, as precipitation totals vary from normal, is of great interest.

Some of the Colorado duststorms of March are described by Choun [1] as the most severe and prolonged of record in that State. Visibility was often reduced to less than 10 feet, with consequent interference to traffic of all kinds; and sand, carried by winds of near-gale force, removed paint from automobiles, and pitted windshields, on the highway south of Pueblo.

[1] H. F. Choun, Climatological Data: Colorado Section, March 1936.

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